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The latest telegraphic quotation for sugar in New York was $4\frac{7}{16}$ for 96° test. Willett & Gray's latest circular says, "the next change, when it comes, will be an advance, and quite possibly something more than is anticipated."

The catalogue of William Brothers of Ceylon, entitled "Tropical Seeds and Plants, for 1899-1900," has been received by us, and furnishes a list of the best and most valuable plants suitable for cultivation in tropical latitudes. It may be had by addressing the firm at Henaratgoda, Ceylon.

"President McKinley has given a wise definition of the word imperialism," says Wo Ting Fang, the Chinese Minister at Washington. "To be more accurate, he defines imperialism to mean civilization and liberty. If I may be permitted to add another meaning, imperialism in your case should be fairness and just treatment to all people, without regard to race or color."

It may not be generally known, but it is not the less a fact, that the most valuable crop or product in the United States is poultry. The last census showed that the value of poultry and eggs produced in one year was $590,000,000. The number of eggs from hens alone was 9,836,674,922. Horses rank next, $500,000,000. Very few people have any idea of the national value of hens. Not only is this the most valuable item of food, but it is also the healthiest.

The February freeze in the southern United States appears to have been quite as disastrous as that four years ago. Many of the orange trees, which were then killed to the roots had grown and gave promise of a fair crop for this year. But nearly all the trees have again been killed by the frost. The result of this disaster will be that the fruit growers will substitute other crops. In all the Gulf States from Florida to Texas, most of the fruit trees and vegetables have been killed. The loss in Texas alone is estimated at over $1,000,000.

The grafting of the coffee trees, has lately been successfully done in Java, so far as the growth is concerned. Liberian stalks were used and Java grafts successfully grown on them. The purpose is to obtain a healthier and hardier stock for propagating choice varieties. It may be possible, in this way, to obtain a tree that will resist the attacks of blights and insects. The experiment is well worth trying, where this object is sought. The best time to do this is when the tree is young—perhaps one to two years old.

The Consular Journal and Greater Britain, says that, according to statistics published by the French Ministry of Agriculture, the consumption of the flesh of horses, mules, and donkeys is steadily increasing in Paris. The number of stalls at which it is offered now reaches 193. The number of horses brought to the shambles in the last year was 21,667; of mules, 52; and of donkeys, 310; but 734 horses 1 mule, and 7 donkeys were condemned as unfit for human food. The prime cuts brought about 1 franc (19.3 cents) a pound, some of the inferior parts bringing little more than 10 centimes (2 cents) per pound.

An interesting experiment and one that may be pregnant with much value to the sugar cane industry, is about to be tried in Trinidad. An ozone manufacturing firm have applied ozone to beet and found that it has increased the yield of sugar crystals by thirty per cent. The firm now desire to be allowed to erect a plant at a sugar factory in Trinidad to try the experiment with cane, and they will carry it on entirely at their own cost. The matter was brought up at a meeting of the Agricultural Society and several planters present intimated their willingness to allow the ozone manufacturers to try the experiment at their respective factories. —Demarara Argosy.

President McKinley has sent to the Senate an inventory of the property of the Hawaiian Government transferred to the United States under the act of annexation, according to a report made by Special Agent Sewall. The estimate places the total of valuation at $10,873,406, under the control of the various departments, as follows: Foreign Affairs, $60,625; Interior, $4,612,766; Finance, $18,399; Attorney-General, $2,104; Police, $17,351; Judiciary, $80,097; public instruction, $501,063; government lands, $5,581,000. The statement shows that of the public lands $4,147,700 worth of them are farming and grazing lands and $1,481,800 worth of them town lots. There are 76,270 acres of coffee land, 25,626 of cane land, 977 of rice land, 751,177 of grazing land and 908,280 of forest land.

The beet sugar industry in the United States is rapidly gaining a sure foothold in various parts of the country. It is stated that seventeen factories are already up or in course of erection, but like all new enterprises, some of them have not proved successful, owing to various causes. Still the industry is bound to be successful, for beets can be profitably grown in every state of the Union. Although the yield of beet sugar in the United States for 1899 was only about 70,000 tons, yet it will increase rapidly when good factories are provided and the beet farmers learn to grow and handle their crops properly. We shall not be surprised if the outcome for this year exceeds 100,000 tons of sugar, after which the industry will expand more rapidly and keep up with the increase of population. At the same time cane sugar will always be in demand, it being in some respects, superior to beet sugar. Their interests will never clash.

Colocasia.—The growth of this food Caladium, the Taro of the Hawaiian Islands, has been surprisingly rapid at the Station. Three roots were planted in January, 1894, at the corners of an equilateral triangle of four feet on a side. The roots were small, evidently of but one year's growth and came from the Forestry Station at Santa Monica. The clump in the summer of 1898 measured twenty-five feet in diameter from tip to tip of outside leaves, and was nine and a half feet high. The largest leaves were three and a half feet long and two and a half feet wide. The stems of these leaves were from five to seven feet long, and were in some cases three

and a half inches in diameter. The temperature at the Station, since these Caladiums were planted has ranged from 24° to 110°, but anything below 35° kills the leaves. This is the largest Caladium clump heretofore recorded in California. It stands where it receives an overflow from the reservoir, in a small stream, with considerable regularity.—Report of the Ag. Experiment Station of the University of California.

THE FUTURE OF SUGAR.—Willett & Gray say: "If we are conservative in our estimates, and the year 1899-1900 requires for consumption with average increase, say, 8,450,000 tons, then, with a supply at its beginning of 430,000 tons, the production of that campaign should reach, and promises to reach, at least 8,500,000 tons, or an increase of, say, 750,000 tons over 1897-98. The cane sugar crops of the world have been steadily held at about 3,000,000 tons for the past four campaigns, while the beet crops were subject to large variations—from 4,285,438 tons to 4,916,486 tons—but have never yet reached the height of the requirements for 1899-1900, say a possible 5,500,000 tons; for we question the ability of cane sugar countries to produce much in excess of their standard —3,000,000 tons in 1899-1900. The largest beet crop ever produced was 4,916,496 tons, and the largest cane crop 3,-531,413 tons of which Cuba made 1,040,000 tons. This combination of facts and figures indicates to us that sugar has started on an improvement course for the next two campaigns."

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PROSPEROUS HAWAII.

The extraordinary prosperity or "boom" in business that now prevails throughout the United States, from the Atlantic to the Pacific, has reached these islands and may be seen in almost every branch of industry. So far as regards Hawaii, this is partly due to the prosperous condition of the sugar and rice industries, and partly to the influx of people from the mainland and Europe—tourists they may be termed—bringing capital for investment, which has created an unusual demand for land and dwellings, not only in and around Honolulu, but throughout the group. It is stated that there has been a constant average of over two hundred buildings in process of erection in or near the city, during the past year,

some of them for parties residing abroad; and this activity seems likely to continue for an indefinite period. Some of these stores and dwellings have been very costly and handsome—models of the finest recent city and suburban architecture, that would be a credit to any of the older cities of the United States or Europe. Some of the new buildings are of the fine bluestone quarried near the city, resembling granite. But wood is chiefly used as being better adapted to our warm climate. All the lumber required for building purposes here is brought from the northwest American coast. This service alone employs a large fleet of sailing vessels, kept in constant service.

Undoubtedly the chief factor in this activity of local trade is the prosperity of the sugar and rice industries, resting on what may now be termed a guaranteed basis of sure crops, an abundance of artesian water for irrigation, freedom from frosts or hurricanes, and the very favorable conditions on which the sugar crop is disposed of to the several refineries of California and New York, which take the entire output at the market price.

Another and secondary cause of this industrial activity is the frequent arrival from the mainland and Europe of wealthy capitalists and tourists who visit this group in the fine steamships now employed in the trans-Pacific service, seeking health and pleasure by escaping from the snows, blizzards and winter attacks of pneumonia and grip, which scatter seeds of death from the Atlantic to Puget Sound. Many of these tourists have long had a desire to visit Hawaii, concerning which so much has been said and written of late years. Every month hundreds of tourists arrive, who, on landing, exclaim, "the half of it has never been told us." Many of these being possessed of an abundance of this world's goods find just the spots they had long sought, and make purchases in this "Paradise of the Pacific"—perhaps near the sea shore of Waikiki,

> "Where a leaf never dies in the still blooming bowers,
> And the bee banquets on through a whole year of flowers;
> Where simply to feel that we breathe, that we live,
> Is worth the best joys that life elsewhere can give."

Or, they may prefer to invest in shares of some of the fine sugar estates of Hawaii, which have been considered as safe as any American stock investment, when based on fair val-

uations. Prior to annexation, very little notice was taken of them by capitalists residing abroad, and they were quoted much lower in value than they now are.

So far, Hawaiian sugar stock investments have been considered reliable and profitable; but it is well to remember that every road has its turn. Due caution should be observed regarding investments, whether of land or stocks, here or elsewhere. Nearly all our old sugar corporations are paying fair dividends, and those that are able to establish the system of *regular monthly dividends* may be classed as "gilt edge," and will always be sought for by the laborer and others dependent on regular income for support.

There is, however, danger of over-trading in this as well as in other lines of business, and when reverses come, it is not the originators or promoters of the enterprise who suffer, but those of limited means, who have made investments solely to provide for support. There are seasons of prosperity and of adversity in every country, and Hawaii will be no exception.

Four new sugar corporations have been chartered in these islands since the first of January of this year, viz: "Kihei," on Maui, "Niulii," and "Kealakeakua" on Hawaii, and "Maunalei" on Lanai. These are all new enterprises, except that of Niulii, in the Kohala district, which combines with it the adjoining Halawa estate of Dr. Wight.

Efforts are also being made to establish new plantations at Olaa and Puna on Hawaii; at Wahiawa on Kauai; at Palaau on Lanai, and one on the westernmost island of the group, Niihau. Also Nahiku on Maui.

There is a growing disposition to consolidate some of the adjoining sugar estates on each island and work them under one management or corporation or combine it may be termed, with the view of reducing expenses. Where this change can be effected without too great cost, it will no doubt result in economy in the management, and consequently in profit to the shareholders.

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Great indignation has been very justly excited in the United States, on account of the quality of the canned beef supplied by contractors to the government for the army while in Cuba. It is more than probable that a large part of the poor beef supplied was furnished by parties who had old stock on hand, which had been canned for several years, and was unsaleable for home consumption.

THE SUGAR INDUSTRY IN QUEENSLAND.

The Mackay Standard, in its annual review of the industries of Queensland for 1898, has the following regarding sugar:

The staple agricultural product of this district is sugar, the income derived from any other source not being worth mentioning. At the beginning of the year prospects were very good, and a very large output was anticipated, but owing to adverse weather and disease in the cane these hopes were not altogether fulfilled. One pleasant feature of the season was the decrease in the ravages of insect p sts. A good deal of the immunity from these pests is due to the onslaught made on the beetles by the various branches of the Insect Pest Destruction Fund. The loss for the year was trifling, and now that the Government has voted £2,000 for the purpose of giving an endowment of £ for £ for the destruction of beetles, there are hopes that this pest may be virtually exterminated.

The price of sugar was higher than in 1897 owing to a decrease in the production of European beet sugar, and the higher rate ruling for imported cane sugars. The price received this year will average about £8 10s. a ton for 88 per cent. net titre. Whether there will be a bonus this year or not cannot be said. The average sugar purity was about 94. The total output of sugar up to December 31 was 3,100 tons, and 1,500 tons manufactured by the Proserpine Central Mill may be included in the tonnage exported from Mackay. Owing to the drought the crops for next year's crushing are not forward, and the outlook is by no means as good as that of last year. Still, with a good rainy season, and fair weather conditions during the other part of the year there is no reason why the season of 1899 should not be a successful one.

The following is a comparative statement of the area under cane, the area of cane crushed, the sugar produced and the average product per acre, for the past seven years:

Year.	Land under cane.	Area crushed.	Sugar produced	Average per acre.
1892	15,853	11,778	15,156	1.28
1893	16,560	13,924	24,872	1.77
1894	21,848	16,379	27,927	1.70
1895	20,554	15,556	22,839	1.46
1896	22,500	16,800	16,354	1.02
1897	24,250	18,500	22,438	1.21
1898	27,500	23,960	33,100	1.38

Most of the mills. in anticipation of having to treat an abnormal crop, made large additions and alterations to their machinery.

An experimental station with laboratory and complete appliances for exhaustive test work, was established at the State Nursery This will be a great boon to agriculturalists, and was an institution that has been long wanted and ofted asked for.

The cultivation of coffee still seems to have considerable attractions for farmers and others, and it is evident that from the increasing attention given to the cultivation of the plant, the production of the coffee bean is to take a prominent place among the industries of this district.

The State Nursery at Mackay, under the management of Mr. D. Buchanan, has been of great service in the distribution of products new to the colony. There are now upwards of sixty different varieties of cane growing at that place, the value of which can only be effectively learned when the chemist has submitted them to test in his laboratory. Scientific farming still claims a good deal of attention in the district, and now that the Nursery has been converted into an experimental station, there should soon be available a large amount of reliable and valuable information.

The number of South Sea Islanders employed in the district is 1,948.

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KING KALAKAUA AND PUNCHBOWL HILL.

The recent proposition to make a cemetery of the interior of Punchbowl, recalls to the editor of this periodical an incident that occurred during the early years of Kalakaua's reign—the last of the Hawaiian kings—which has probably never appeared in print.

Kalakaua was public-spirited and often referred to how he would improve the city and its surroundings. He carried out this idea in the planning and erection of the palace—now the executive building; but this was only accomplished when he found a premier who seconded his laudable ambition.

Early one morning in 1873 or 74 while the writer was taking his accustomed walk around the makai slope of Punchbowl Hill (there were in those days but few or no houses or trees on the hill above the Queen's hospital) he met the king on foot accompanied with some fifteen or twenty soldiers, all,

including the king himself, dressed in light linen blouses, the boys carrying buckets of water with oo's for digging, walking leisurely up the steep path which then and still serves as the shortest foot-path to the summit. On meeting the king, as he crossed our path, we asked, after the usual salutation:

"Where is your majesty bound now, at this early hour?

"Oh, I'm carrying out a plan that I have long had, of improving Punchbowl."

"And how are you going to do it?"

"My plan," he replied, "is to make a park of this crater, and I intend to plant trees there."

"But they will not grow there without water."

"I intend to water them," he replied, "and some of my boys are now carrying water and young trees and seeds to plant there."

Among the trees which he proposed to have were algaroba, kukui, monkey-pod, and various foreign tree seeds, which he had lately received.

The king and his soldier boys, with their tins of water and young trees then resumed their climb up the steep hill. These morning trips were repeated once or twice a week for several months, the water being carried all the way from the palace grounds in tin cans slung across their shoulders, in Hawaiian style. Some of the trees died, others grew. But for many months his majesty personally looked after his pet plants; and the fine grove that is now seen growing in the crater, *is the result of King Kalakaua's personal interest in starting it.* He intended this crater to become a beautiful place—a resort for the future population of Honolulu—to be named perhaps "Kalakaua Park," as our other favorite resort, at the foot of Diamond Head, was appropriately named after his royal consort, "Kapiolani Park." A more appropriate memorial to the last of Hawai'i's native sovereigns could not be made.

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HAWAIIAN COMMERCE.

The annual report of the Collector-General of Customs, F. B. McStocker, has been issued, and as usual presents full and interesting statistical details of the foreign commerce of Hawaii and the revenue derived from this source. The work of this bureau has become very large, owing to the rapid increase of importations and shipping and with it the revenue,

which, for the year 1898, amounted to $896,975.70. For the current year, 1899, the revenue will probably exceed one million. The harbor accommodations are already insufficient for the rapidly increasing trade and the leviathan steamships of eight and ten thousand tons measurement, which are now on the stocks and will soon demand entrance, with coal and storage accommodations commensurate to their size. This work demands the urgent attention of government, or our trade and shipping may be forced to seek other trans-Pacific routes. Quite naturally our trade with the United States and Asiatic ports is receiving an impetus from annexation, which will be largely increased when American laws and regulations shall be fully established here, in the early years of the new century.

The value of imports into Hawaii, for the year 1898, and the countries from which they came, are stated in the official report as having been as follows:

United States	$ 8,695,591 63
Great Britain	1,287,726 67
Germany	352,643 65
China	328,851 07
Japan	354,324 98
Australia and New Zealand	198,384 61
Canada	283,383 40
Islands of the Pacific	7,292 12
France	43,655 55
Other Countries	99,636 33
	$11,650,890 81

The report specifies in detail all the importations made during the year, even to the number, in some instances of each article. Every item in the long list of importations is given with the invoice value attached. Many of the goods now imported are free, especially those from the United States, under the reciprocity treaty. After the formal ratification by Congress, of the annexation of Hawaii, all American manufactures or products will enter free of duty, while European and Asiatic goods will pay higher duties than are now imposed on them here.

The local territorial government will feel the loss of the customs revenue, which will call for the imposition of higher internal taxes, to meet the public improvements required on

each of the islands of this group, especially for roads to open up new districts, which will be occupied by industrious farmers as they become available for settlement, by affording easy and rapid communication with the various ports or landings.

The Hawaiian fleet of inter-island steamers and foreign sailing vessels has been added to during the past year, and now numbers about 70. As our trade is increasing there is room for more and larger vessels, which are needed especially in the lumber trade with the northwest coast. These islands possess no lumber forests to speak of, and are dependent on the American forests for their wants, which exceed one hundred millions of feet annually.

Passengers to the number of 17,229 arrived here during the past year, while the departures were only 7,313. Most of the excess of arrivals comprises Japanese, of whom there are now between forty and fifty thousand, mostly males.

The amount of specie imported during 1898 is stated to have been $1,282,075. During the past eleven years, the specie importations have aggregated the sum total of $11,680,390 81 as reported by the customs returns.

Statisticians residing abroad may be able to gather from the Collector's report some idea of the progressive spirit of young Hawaii, when they find from it that nearly one thousand bicycles and 222 carriages were imported in one year, of a combined value of over $52,000. Verily one of Uncle Sam's latest acquisitions is determined not to be left behind, when the order is given from the front—"Move on."

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WHERE DOES ALL THE GOLD AND SILVER GO?

Occasional reference has been made in the public press lately to the amount of coin now in the Hawaiian Islands, and there seems to be much diversity of opinion about it, some placing the amount under two millions, others at about five millions. Both of these estimates may be far below the mark.

One million of Hawaiian money was coined in San Francisco in 1883, for circulation here, most of which is still in circulation. The amount of American money in the country at that time was probably much larger. Prior to that time American money was often shipped to China, but since that date Chinese merchants have become more accustomed to making their remittances in banker's exchange in payment

for goods imported. The drain of specie to China has in consequence declined. The same remark may apply to Japanese remittances.

Conceding that the amount of coin in these islands in 1883 was comparatively small—two, three or four millions—let us examine the imports of specie during the past few years. Commencing with 1887 to this date, which are the only years we have the report of, we find the amounts entered at the custom house were as follows:

1887	$ 900,000 00
1888	1,209,077 25
1889	1,149,517 20
1890	829,222 30
1891	978,355 25
1892	655,912 00
1893	983,431 00
1894	608,700 00
1895	374,222 50
1896	1,100,908 99
1897	1,155,575 00
1898	1,282,075 72

Here we have a total specie importation into Hawaii, during the past twelve years of $11,227,007. This includes only what has been entered at the custom house. Besides this, considerable coin has been brought in by private hands, which of course, have not been so entered. But let this go, as it is offset by coin taken away by passengers. The amounts now coming through the custom house are steadily on the increase, and during the first three months of this year the entries of coin have been $550,000.

The question will be asked—where is this large amount of coin? It is not in the banks; then where can it be? We have here a population of say 130,000, comprising largely Japanese, Chinese, Hawaiians, and comparatively few foreigners. Three-fourths of the population comprises people who are not accustomed to making banks the depositories of their gold and silver. Yet a large portion of them are employed, and are receiving pay for their services in some way or another, mostly in coin. Many of them came here to get money, and they do get it and hold on to it, hoping some time to be able to buy land or take it away, if they leave the country. The 12,000 Portuguese, the 20,000 Chinese and the 40,000 Japanese, are many of them thrifty and close as regards their gold and silver, hoping by hiding it, some day to be able to

buy land, or if they return to their own country, to go as rich men, compared with their countrymen at home. Many Hawaiians also save and hide their money till they can buy a house and land. Only lately a native woman, who was not known to possess the amount, bought at public auction a house and lot for $2,300 and paid for it in cash, to the surprise of the auctioneer and others. The Portuguese especially are very saving of their earnings, and only a few days ago, one of them—a laborer on the wharves, earning two dollars a day—overhearing a remark made by a citizen that he would like to borrow a few hundred dollars, stepped up to him and offered all he wanted, he only wished it taken care of. There can be no doubt that a large amount of coin is held by the laboring classes throughout the islands, and the more that each has, the stronger is his desire to increase it.

Taking all the facts into consideration, there can be no doubt that the amount of coin now in these islands exceeds ten millions. No one can say—because he does not see it or know where it is, therefore it is not in the country. The importations noted above certainly have not been shipped away and silver is seldom exported in these days, at least in large amounts. When remittances are wanted abroad they are generally made in exchange.

However, all estimates of coin in these islands must necessarily be based on conjectures, the unknown factor being the amount held by people who prefer to be their own coin custodians; and until more satisfactory data can be produced, it may safely be maintained that there are now in Hawaii at least ten millions of dollars in American and Hawaiian coins.

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THE COLONIAL SYSTEMS OF THE WORLD.

A valuable report on the colonial systems of the world has been prepared by A. P. Austin, Chief of the Bureau of Statistics of the Treasury Department, from which it appears that the colonies, protectorates and independencies of the world number 125. They occupy two-fifths of the land surface of the globe, and their population is one-third of the entire people of the earth. Of the 500,000,000 people thus governed, over three-fourths live between the tropics of Cancer and Capricorn, or within what is known as the Torrid Zone, and all of the governing countries lie in the North

Temperate Zone. Throughout the globe-circling area known as the Torrid Zone no important republic or independent form of government exists save upon the continent of America.

The total imports of the colonies and protectorates average more than $1,500,000,000 worth of goods annually, and of this vast sum more than 40 per cent. is purchased from the mother countries. Of their exports, which considerably exceed their imports, 40 per cent. goes to the mother countries. Large sums are annually expended in the construction of roads, canals, railways, telegraphs, postal service, schools, etc., but in most cases the present annual expenditures are derived from local revenues or are represented by local obligations.

The most acceptable and therefore most successful of the colonial systems are those in which th largest liberty of self-government is given to the people. The British colonial system, which has by far outgrown that of any other nation, gives, wherever practicable, a large degree of self-government to the colonies; the governors are in all cases appointed by the Crown, but the law making and enforcing power being left to legislative bodies, which are elected by the people where practicable, in minor cases a portion being elected and a portion appointed, and in still others the appointments divided between the British Government and local municipal or trade organizations, the veto power being in all cases, however, retained by the home government. The enforcement of the laws is intrusted to courts and subordinate organizations, whose members are in many cases residents or natives of the communities under their jurisdiction. In the French colonies less attention is given to law making and administration by local legislative b dies, the more important of the colonies being given members in the legislative bodies of the home government. In the Netherlands colonies and in the less advanced communities under British control the laws and regulations are administered in conjunction with native functionaries.

Of the 125 colonies, protectorates, dependencies and "spheres of influence" which make up the total list, two-fifths belong to Great Britain, their area being one-half of the grand total and their population considerably more than one-half of the grand total. France is next in order of number, area, and population of colonies, etc., though the area controlled by France is but about one-third that belonging to Great Britain

and the population of her colonies less than one-sixth of those of Great Britain.

Commerce between the successful colonies and their mother countries is in nearly all cases placed upon practically the same basis as that with other countries, goods from the home countries receiving in the vast majority of cases no advantages from those from other countries in import duties or other exactions of this character affecting commerce. In the more prosperous and progressive colonies, the percentage of importations from the mother countries grows somewhat less as the business and prosperity increase. The chief British colonies in North America (Canada and Newfoundland), which in 1871 took 50 per cent. of their importations from the home country, took in 1896 less than 30 per cent. from the United Kingdom; those of South Afric (Cape Colony and Natal), which in 1871 took 83 per cent. from the home country, took but 71 per cent. in 1896: those of Australia and the adjacent islands, which in 1876 took 48 per cent. from the home country, in 1896 took but 40 per cent. The French colonies now take from the home country about 42 per cent. of their total imports, while the British colonies obtain about 40 per cent. of their total imports from the home country.

The report is accompanied by tables showing the area, population and commerce of the colonies, protectorates, dependencies and "spheres of influence," of various countries of the world having possessions of this character.

While China has no colonies in the accepted sense of the term, the area of her divisions, which are termed "dependencies," is vastly greater than China proper, being 2,881,560 square miles. The total population of the dependencies, however, is but 16,680,000, while that of China proper is 386,000,000. The dependencies so called are Manchuria, Mongolia, Tibet Jungaria and East Turkestan. In some of these dependencies the government is directly administered by Chinese officials in close conjunction with residents of the territories, especially so in Manchuria and Mongolia. In Tibet, the enormous distance and difficulties of communication have made the country more or less independent of the suzerain power of China, the only visible sign of the supremacy of the central government being the presence of "ambans" or residents, with their military guard at the capital. Appointments to the first offices of the State are bestowed by the Emperor of China, and all measures of consequence are referred to the Court of Peking. The internal government is intrusted entirely to natives, the executive administration being in the hands of a regent and four ministers, who appoint the governors of provinces and designate their collectors of revenue. No separate statistics of the commerce of these provinces or dependencies are obtainable.

RECORD OF THE RAINFALL AT HONOLULU FOR THE PAST FIFTEEN YEARS.

From Daily Readings at the Residence of Mr. W. R. Castle. (Elevation 50 feet.)

Months.	1884	1885	1886	1887	1888	1889	1890	1891	1892	1893	1894	1895	1896	1897	1898
January	1.07	.06	.38	5.85	.78	87	2.00	1.19	6.50	2.57	3 08	2.38	2.20	.94	3.97
February	1.68	.67	.94	13.04	1.98	.77	9.85	4 84	3.18	13.45	12.42	1.81	1.30	.79	7.60
March	4 06	2.96	1.63	2.24	2.25	.38	7 83	.69	29	.75	1.51	1.46	3.11	1.20	9 66
April	3.52	5.11	1.19	2.35	2.36	.94	4.84	.88	1.60	2.22	2.25	1.01	2 40	.93	1.26
May	.44	11.56	1.61	4.10	1.97	.81	1.20	.23	5.10	1.50	.10	.93	1.51	.96	.68
June	.48	2.51	.63	.95	.47	.97	.86	.43	.67	.29	.59	.90	.78	.99	2 07
July	1.40	4.27	.56	.67	.15	.48	1.30	.58	.53	.28	.45	.45	.00	.81	.63
August	.83	2 85	.43	1.02	4 22	1.16	1.00	.58	1.14	1.04	.08	1.41	1.33	.39	.58
September	.32	1.17	2.26	.95	2.80	1 81	.60	.47	.42	.91	.56	2.15	.39	2.66	.15
October	4.66	.03	1.84	.44	1 31	.95	1.36	3.62	3.01	.64	1.76	.41	2 04	1.61	.52
November	.54	1.40	8.74	11.84	3.39	1.50	1.80	.39	.35	8.33	8.33	4.27	2 31	1.88	.50
December	3.76	3.14	3.47	6.37	18.08	2.82	1.64	1.50	3.97	1.30	2.41	12.02	5.54	.51	.77
Totals	22 76	35.73	23.68	49.82	39.76	13.46	34.28	15.40	26.76	33.28	33.54	29.20	22.91	13.67	28.39

Average for 15 years, 27.53 inches. Maximum, 49.82 inches; minimum, 13.46 inches.

MODERN POLARISCOPES.

By Geo. Stade.—International Sugar Cane.

In the present day a thorough rigorous control is exercised with regard to everything in connection with sugar, not only in the factory but also in the field, and in commercial dealings. The check maintained over the work done in sugar works and refineries extends, in well-managed concerns, to the minutest details, and even a difference of a few tenths of saccharose in the rendement or yield is considered to be a very serious point calling for full attention. One tenth of a per cent. more than practically necessary left in the residues such as bagasse, slices, scum or charcoal, now often gives occasion for close investigations, and steps are taken to prevent such losses as nobody thought anything of in "better days"—and so, for instance, the appearance of the "night chemist" can be accounted for! In these times of close competition the days are past when planters could afford to disregard a per cent. more or less so long as the prices were fair, and in leading agricultural circles the percentage of saccharose in the raw material (whether cane or beet) is watched anxiously enough. There is no need of calling special attention to the anxiety manifested by the commercial body at large with regard to "a few tenths," the lawsuit of the dealers in the United States against the government, now pending, on account of "small" differences in the analyses, of raw sugars, and amounting to some odd million dollars, supplies a fine object-lesson in regard to the importance of exact polarization.

The property possessed by a sugar-solution of deflecting polarized rays will probably remain (for the near future at least) the only basis of all practical methods of analysis. However imperfect this basis may be in many cases, up to now the progress of chemistry has not discovered a more reliable or more suitable way since Prof. Eilhard Mitscherlich invented the first Polariscope, now nearly fifty years ago. Though the foundation principle of this method has remained the same ever since the analysis of saccharine juices commenced to play such an important part in the technical, agricultural, and commercial sugar-world, the instruments have, nevertheless, been considerably improved and brought to great perfection.

In former days the Ventzke-Soleil Polariscope (introduced

mainly by Prof. Scheibler into the sugar industry) and the instruments of Laurent, not to mention some other less practical constructions, were almost exclusively used for polarizations. These instruments of Scheibler and Laurent are still found in some places and have their drawbacks—the former, that of not being sufficiently sensitive, particularly for dark colored solutions and for people who suffer from color-blindness; the latter (originally constructed for scientific purposes) that of not being useable with ordinary rays, but only with special lamps burning sodium salts.

These old constructions had to give way to the instruments made on the "half shadow principle" of Jellet-Corner, and working entirely with the rays of an ordinary lamp. The modern polariscope of this kind works with single quartz-wedge compensation, and gives very exact readings even for persons with a defective sense of color, who are met with more frequently than is desirable), and for colored solutions. However the division of the scale from 0° to 100° of this instrument has to be checked by standard solutions or by normal Quartz-Plates.

The instruments with double Quartz-Wedge compensation obviate this inconvenience. They have two reading scales which permit in a very easy way the accurate control of any point of the scale, without the use of other apparatus. At the same time most of these instruments permit the reading of left polarization from +0° to —100° which is in some cases particularly useful for analysing glucose, inverted sugar, &c. The above-mentioned polariscopes are worked—like the old color instruments—with two fields of observation only, and are sufficient for all ordinary requirements of the factory, the field, and of trade, of course they require good vision to obtain exact results.

The very best and newest apparatus, however, enables almost everybody to make, without difficulty, an exact reading of 0.1%. This is the three division observation instrument, made according to Prof. Lippich's Patent. Combining, as it does, all the advantages of the half shadow instruments this is, no doubt, the most perfect polariscope in the market, and with regard to sensitiveness and precision has no equal up to now.

Besides these instruments with full readings of from 0° to 100°, there are in use some constructed for special purposes,

as for instance, the polariscope with limited reading of from 0° to 35°, which is very handy for analysing beets, slices, and canes, (particularly on Seed Farms, where sometimes over 1,000 polarizations are made per day). The advantages which instruments of this kind possess are, among others, that the Quartz-Wedges are very short and consequently can be made to perfection at moderate prices. Without going into theoretical details it may be mentioned, however, that a good polariscope must have absolutely faultless quartz-wedges, as only $\frac{1}{10}$ of a millimetre difference in the thickness of a quartz platte is equivalent to a difference of $6\frac{1}{4}\%$ sugar. This shows clearly that all plates, glass covers, nicols and crystals, have to be perfectly constructed, as the polarizing ray has to travel through about a dozen planes, and the slightest fault in any one surface renders the analysis illusory. For sugar analysis exclusively, the polariscope for concentrated solutions of 80° to 100° is highly to be recommended if many analyses have to be effected, as for instance, in a refinery or in a commercial laboratory. It possesses the same practical advantages as the above mentioned polariscopes with limited reading scales.

All the above-mentioned instruments (which are made for use in temperate climates) nevertheless develope certain very disagreeable qualities as soon as the average conditions of temperature and humidity are changed. To eliminate these faults, caused by different meteorological conditions, the Standard Polariscope has been especially constructed, which is guaranteed to be—practically speaking—more correct under any change of temperature than any other instrument, and is available in all climates, tropical or temperate. Prof. Dr. H. W. Wiley, the well-known chief chemist of the Department of Agriculture of the United States of America, was the first who pointed out that polariscopes are not correct under all circumstances. In his lecture "On the Influence of Temperature on the Rotation of Sugar Solutions in Quartz-Wedge Compensating Polariscopes" delivered in Vienna at the "International Congress for Applied Chemistry, 1898," he pointed out that the influence of the temperature in hot climates is too great to be neglected. At the meeting of the foreign section of the "Union of Sugar Technologists," Professor Wiley again specified his observations. American chemists use chiefly Berlin Polariscopes adjusted at 17.5°C. The mean temperature, however, of the United States laboratories is on an average

about 6° to 8°. higher, for the tropics this difference would sometimes attain from 8° to 25°C. and more, and if in the United States government offices Professor Wiley already finds 0.3% lower polarisation for sugars, for most cane sugar producing countries this figure will certainly be far higher. Professor Wiley said:

"Great danger is also to be feared from pressure on the "quartz-wedges from variations in temperature. The wedges "are usually mounted in brass, and since the expansion of "brass is different from that of quartz, a pressure may be pro-"duced which will materially change the rotating power of "the compensating wedge. It is highly important that the "wedges be mounted in such a way that a change of tempera-"ture will produce no change in rotating power due to pressure "or strain. Again, the specific rotating power of a quartz-"wedge increases with a rise of temperature. Hence it hap-"pens that at 25°C. a less thickness of the wedge is required "to restore the rotation produced by a sugar solution than at "17.5°C. The apparent strength of the sugar solution is there-"fore diminished. Further, my investigations have shown that "the specific rotation of a sugar solution decreases with a "rising temperature; and the amount of this change has been "determined."

Professor Wiley found that with ordinary Mohr flasks, combining all factors in one expression:—

1° C. = —0.029° polarization, is to say, a solution which polarizes 100° at 17.5°C., will indicate only about 99.7% at 25° C. Further inconveniences have been pointed out by another chemist of high standing and acquainted with tropical climates, Dr. H. Winter, of Soerabaya (Java). In tropical and particularly moist climates with great variations in temperature, it was found that the "Nicols," &c., of the instruments got "cloudy," and consequently the readings were indistinct and incorrect. The newest apparatus often became useless after a short time, and had to be sent home for repair. For this reason, the Standard Polariscope has its "Nicols," &c., protected by glass plates. Besides this, all the other parts exposed to the air are made in such a way that they are unaffected by climatic influences. Moreover the "Standard" is supplied with nickel scales which are not influenced by heat and humidity in the same manner as the old ebony scales, and do not become destroyed or useless by warping. To control

the division of the scales it is, however, always desirable (for places where absolute exactitude is necessary), to have a control observation tube on the spot. These tubes are very useful, save a great deal of trouble, and enable the chemist to have the polariscope—so indispensable for sugar chemistry—always under control without wasting much time. With the help of this invaluable—but far too little known—little instrument, a constant watch can easily be exercised over the whole length of the scale and a security be obtained which is otherwise only possible by the constant use of many normal saccharose solutions. In case of almost all old polariscopes (supposing they are otherwise in good condition and the quartz-wedges not damaged), it would be advisable to have them converted, according to special instructions, into Standards, as this can be effected with sufficient accuracy at a small cost. The price of the new Standard Polariscope is only £20 f.o.b., and it can be obtained through the agency of the writer.

GEORGE STADE.

Memb. Assoc. G. Engineers, Berlin,
Fellow of Germ. Chemical Society,
Care H. Busse, 21, Planufer, Berlin.

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GERMAN VIEW OF THE RESULTS OF THE WAR.

(Frankfurter Zeitung of August 20, 1898.)

The conclusion of peace which ends the Spanish-American war marks a new epoch in history, not only for the United States but likewise for Europe. The United States has taken an important step toward the exclusive control of the American continent; it has also reached beyond that and claimed its share in the conduct of the world's affairs. Since it now controls the West Indies, the construction of the Nicaraguan Canal will be no longer delayed. Then will the eastern and western portions of the Union be brought into closer relations, which will be of important significance not only for the commerce, but for the naval power, of the United States.

From San Francisco westward by way of Hawaii and the Ladrone and Philippine islands, which will be developed into strongholds of American power, the United States will reach across the Pacific Ocean to the Asiatic coast and will have

a powerful voice in deciding the destiny of Eastern Asia, for it has there just as important commercial interests to foster and protect as any of the European powers. That it realizes fully the importance of this and other questions at issue, is evinced by the promptness with which it is proceeding to a notable strengthening of its Navy and standing Army.

With what force and energy the Union enters upon its rightful position among the controlling nations of the world will be shown by a glance at its material resources and productive capacity. There is, first, the fact that in the fiscal year ended June 30, 1898, the Union had a surplus of exports over imports amounting to 2,500,000,000 marks ($595,000,000), while all the European nations show a more or less important deficit in their balance of trade—Germany about 700,000,000 marks ($166,600,000) and England about 2,400,000,000 marks ($571,200,000). Other comparisons are equally instructive. John Shafroth, in his speech before the House of Representatives on the 26th of May last, gave the following statistical data:

In the year 1890, the property of the United States was valued at $62,000,000,000, while the property of the whole world was estimated at $290,000,000,000. The American people, who number 70,000,000 souls, or one-twentieth of the population of the globe, possess, therefore, more than one-fifth of the entire wealth of the human race. The Union has 182,000 miles of railways, half as much as the remainder of the world entire. In the year 1892, the freight transported in the United States was equivalent to 845,000,000 tons carried a distance of 100 miles; in the same year all other countries together transported the same distance only 503,000,000 tons. The annual earnings of the railways of the United States are about $1,000,000,000, nearly half of the railway receipts of the whole world, which amount to $2,515,000,000. The steam marine of the United States registers 14,400,000 horsepower, one-third of the registered steam tonnage of the world.

In the year 1896, the United States produced 10,000,000 bales of cotton, and out of the 13,000,000 bales produced by the whole world the Union alone consumed 3,500,000 bales—that is, more than one-fourth of the entire cotton consumption of the human race. Its production of cereals is more than one-fourth of the crops of the world entire. Its output of coal in 1897 reached 198,000,000 tons; while all other countries com-

bined produced only twice as much—in round numbers 400,000,000 tons. The telegraph lines of the world included, in 1897, 4,908,000 miles of wires, of which 2,506,000 miles, or more than half, are in the United States. The postal service of the world transports yearly 17,000,000,000 letters, of which the United States alone sends 5,000,000,000. The mechanical appliances which the United States employs to aid and supplement human labor comprise more than one-fourth of the equipment of the entire world.

These figures, to which might be added others equally significant, will suffice to show that the people of the United States, in respect to their resources and capacity of performance, can no longer be compared with any other single nation; the comparison must be made with the entire rest of the world. They form the clearest and most convincing proof that the United States is, in fact, a great world power and as such must have a world policy.

Thus far, there is not the slightest cause to regret the development of this power; we believe, on the other hand, that it is a cause for rejoicing to all mankind. We can, indeed, see the numerous dark spots which shadow the condition of the American people; but when one compares with these the many bright spots, it is seen that there are far more lights than shadows. The American national character wins when compared with that of other nations; and it must be remembered that in the frankness and intelligence of this national character, its tireless energy and ardor for improvement, are given the conditions and the strength which modify even the defects of the people and shield them from the dangers of degeneration. Labor, freedom, tolerance—these are the foundations upon which American statehood rests, and upon which it can securely rest in future.

The Americans have no aristocratic caste, born with the pretension of being better than other men, and for whose benefit the masses should toil; they have no clericalism which seeks to rule and finds in all progress an enemy that must be resisted at every cost; they have, finally, no bureaucratic traditions, which stifle every movement toward freedom and make the citizen the slave of the machinery of state. This does not please many European diplomats and their adherents, and they give unrestrained expression to their aversion to the "free-and-equal masses," the "plebians," etc. They would

even give expression to this aversion in overt acts if, indeed, the United States had not already become too great a power to be bullied.

The Kreuz Zeitung (Berlin) has been greatly distressed over the reasons which have led us in the present war to the side of the United States. After considering and demolishing several of such reasons, it is all the more forcibly struck by the final one—"because the United States is a republic!"

That is very superficially conceived. If we had ever rhapsodized over the republican form of government, as such, we should have been long ago thoroughly cured of such delusions by what has happened in France. We are not concerned with the outward form, but with the substance—the independent, self-reliant citizenship; the respect for honest labor; the tolerance of free thought and action; the generous, unprejudiced humanity of thought, feeling, and deed. All these things we have not found in Spain, nor among many of the friends of Spain.

What would have happened had Spain triumphed in this war? National darkness, narrowness, and corruption would have prevailed; and everywhere the advocates of political and clerical absolutism, which the Spanish government system breeds and fosters, would have gained new and important strength. But this has not happened, and for these reasons it can be fairly said that the victory of the United States is a triumph for progress and a gain for mankind.—U. S. Consular Reports.

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SUGAR PROSPECTS IN CUBA.

The yield of sugar in the Island of Cuba for the coming season will be but a bare 200,000 tons, the smallest crop ever known to the memory of the oldest planter. This estimate is based upon a careful survey of the situation by the best authorities in Havana, and may be depended upon as accurate in so far as a forecast by experts is possbile to be, and when these figures are compared with those of the Cuban sugar crop of 1893-4, a condition of affairs more startling than was supposed to exist is shown.

The sugar season in the island begins in the latter part of December, and extends to the end of April, during which time every available resource, every yoke of oxen and every plan-

tation hand is brought into use in getting out the crop and grinding the cane, and as the planters have no oxen, no hands and resources, strained and exhausted by the ravages of a guerrilla warfare, they are contemplating the prospects for the season with anything but elation, for many of the cane fields that escaped devastation cannot be worked. And even on those places where grinding will be possible, much of the best cane must be reserved for seed purposes, and among that remaining the grass and weeds, which continued inattention has permitted to grow rampant, have caused great damage, and, all things considered, the estimate of 200,000 tons is thought by many to be too liberal.

The sugar crops of Cuba for the past five years have been as follows:

1893-4	1,054,214
1894-5	1,004,264
1895-6	225,221
1896-7	212,651
1897-8	300,015
1898-9 (estimated)	200,000

Of the crop 1893-4 the United States consumed 900,000 tons of a total consumption of 1,054,000 tons, and with the present limited Cuban crop to be put on the market, the States must import beet sugar from Germany and elsewhere to make up the deficiency. This condition of affairs must exist in a diminishing degree for three or four years to come, for it will take that length of time for the plantations to recuperate the losses incurred through vandalism and firebrand, to rebuild destroyed buildings and re-plant burned cane fields.

At the commencement of the Cuban-Spanish trouble, there were fully 280 sugar estates in successful and profitable operation. Out of this number there were 50 large centrals, having improved machinery and bagasse burners, while to-day there are only 20 centrals in condition to grind, and only 80 sugar plantations all told in cultivation, and many of these are without the means of gathering the cane. Thus it will be seen that between the insurgents and the Spaniards fully 200 sugar estates, worth millions and millions of dollars, have been laid waste, and are now lying idle and deserted, with but a few chimneys standing, gaunt and blackened, to mark the spot where a costly residence once stood in the midst of fertile and

well-cultivated fields, which attested the prosperity of their owners.

On the places spared from destruction, in consideration of heavy sums exacted by both the Spanish and Cuban forces, the oxen have been driven off, the hands reconcentradoed, and the owner left without the means of gathering and disposing of his crop. This condition of affairs has existed until the whole island is almost destitute, and the planters have become land poor.

There is another factor which has contributed largely to the ruin of the property owners of Cuba. This is the edict issued by General Weyler prohibiting the foreclosure of mortgages, or the enforcement of claims for other moneys due. The edict is still in force, with the natural consequence that to-day there are millions of dollars in interest due and unpaid, and the mortgagee can do nothing to enforce payment but beg and then wait and hope for relief from the United States Government. A prominent planter, who is an American citizen, told the Times-Democrat correspondent that he now holds unpaid rent notes aggregating $8,000, due by the purchaser of a residence in Havana, which he sold, and on which not a dollar of either principal or interest has ever been paid, other than the cash payment at the time such sale was effected. Thousands of such cases exist in Cuba to-day, and many of the people who sold their property to secure the money to defray current household expenses are now destitute, even though they hold first mortgages on valuable property, for Weyler's order to protect the Spaniards has been the planters' and property owners' doom. The news of General Wood's intention to extend this protection to debtors in the Santiago district until next April has caused consternation in Havana, for then it will be too late for the planters to prepare for next year's crop, and with his property lying idle, he will lose another year, in which he might have done much to recuperate his past losses. This order extending General Weyler's edict has not been made operative in this district, but the fear is expressed that General Wood's example may be followed here.

Ranking in importance among the large central plantations that have not been destroyed is the Constancia, which grinds the cane of 20 plantations, and which made, in 1894, 50,000 hhds. of sugar of an average weight of 1,500 lbs. There are three lines of railway operated by this big central, on which

are more than 200 cars in constant use during the grinding season. The sugar house machinery alone is valued at $1,500,000. A stock company owns the plant, and although called the property of the Marquis Azpeitegue, the principal stockholders are New Yorkers.

The big central Carracas owned by Emello Terry, is next in importance with a grinding capacity of 30,000 hhds; then comes San Lino, of Montelao, with 20,000 hhds. and St. Gertrudis of Mendoza with 100,000 sacks of 300 lbs. each. The Central America, better known as the Langes plantation, although the capacity is only 80 hhds. per day, is also a very fine estate, and covers over 4,000 acres. It is situated in the centre of ten plantations, and after more machinery has been added will rank among the largest and most profitable estates on the island.

Centrifugal sugar of 96 test can be made in Cuba at 6 rials per arroba, or 3 cents per pound, and pay a handsome profit.

The machinery in general use on the sugar estates is said to be far superior to that in use in Louisiana. The principal makes in use are Five-Lille, Utica Works, Pioneer Iron Works, Dealy & Mirless, and Tate of Glasgow. All the central factories have triple effects and all modern improvements, such as double grinding and bagasse furnaces, which give all the steam necessary for cooking purposes, thus economizing in the expensive item of coal.—Cor. Times-Democrat.

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THE NATION'S TRUST.

At the dinner given by the Home Market Club, of Boston, Mass., to the President, the Secretary of the Navy, in an eloquent address, outlined the Nation's responsibility and duty, as follows:

It is a poor philosophy that peers hopelessly into the future only to learn how far off is the day, not of ruin and dissolution, for that will never come, but of transition to some new form of civilization, some new form of national life, some new arrangement of national boundaries, all of which are necessary accompaniments of the enlarging and advancing progress of mankind. Meantime, our duty is to meet the responsibility that is upon us. Undoubtedly it would be easier if we could shift it from our shoulders and lay it down. It is with a wrench that any man, especially any son of New England familiar with its traditions, and recalling its charms of pro-

vincial life, becomes aware that these must betimes give way to larger demands and more trying exigencies.

And yet the fields that are before us are not altogether untrodden. It is not a new thing in the history of the world for an enlightened and civilized nation to deal with the less fortunate islands of remote seas. A Christian nation should not lose heart at the opportunity of carrying its education, its industries, its institutions and its untold blessings to other less fortunate people. For one, I trust with all my heart that the result of our new relations with the Philippines may be to aid them to the acquirement of the comforts, happiness and benefactions of our civilization; to educate them to their political elevation and to help them to the establishment of their own self-government and their own free existence.

Meantime our association with them, if that association has by the force of events become a trust upon us, may well be accompanied with benefit to them and benefit to us. There will be work in it for the philanthropist, the scholar and the humanitarian. There will be opportunities for the outlet of our own enterprise and trade and commerce. The imagination kindles as it recognizes what those islands of the East may yet become. They are almost an unknown land. We have not yet began to estimate the variety and opulence of their material wealth, their splendid forests, rich with every variety of wood in almost incalculable abundance; their mines of ore of every sort, their valleys teeming with luxuriant productiveness, and capable of supplying the food of the world.

Why doubt and repine, when the time of doubt and repining is inexorably past, and when doubting and repining can do no good? Why shall not the United States, now that these lands and tribes have been intrusted to its disposition, enter upon the trust thus imposed upon it with the determination that, as it began by freeing them from the yoke of oppression, it will go on and insure them still larger blessings of liberty and civilization, and will so bear itself toward them that in securing their welfare it shall also promote its own, and, as always happens when men of nations cooperate in the spirit of justice and goodwill, the reward shall come to both in their mutual increase? Is not that the statesmanship of the Great Master, who limited not His mission or that of His Disciple to His own chosen people, but proclaimed that His Gospel should be preached in all the world unto all nations—that greatest statesman of all time, Jesus Christ?

SUGAR TRUST.

New Directors Elected for the American Refining Co.

At the annual meeting of the American Sugar Refining Co., at Jersey City, it was voted that the accumulated surplus of the company, less dividends declared, including that payable on Jan. 3, 1899, be reserved as working capital.

A resolution was adopted authorizing a revision and amendment of the by-laws of the company. President Havemeyer said the old by-laws were very ragged. We have never had an executive committee. Now we have one, and the authority of managing the company's affairs is placed where it should be. Entire responsibility should not be vested in the president. Under the new by-laws, if I deem a certain officer inefficient I can suspend him, but the directors alone have the power to remove him from office. Under the board of directors the executive committee will have complete authority in all matters, save in appropriating money; no money can be appropriated without the sanction and approval of the board of directors.

The meeting was called to order at noon by President Havemeyer, C. R. Heike being elected secretary, former Secretary John E. Searles being absent. President Havemeyer read his annual address as follows:

"The changed and varying conditions of the business since the last stockholders' meeting has required a change of policy, which, after full deliberation of the board of directors of the company, has resulted in a policy that meets with their unanimous judgment and approval.

"I can assure the stockholders that the board and its officers are doing all in their power to meet these varying conditions.

"It is most suitable that the stockholders should understand that the policy pursued under these changed conditions is in accordance with the unanimous judgment and approval of the board of directors of the company.

"It is always the hope of the directors that the annual meeting may be attended by stockholders in person. While it is gratifying that the stockholders shall show confidence in the board, none the less would it be more agreeable if the stockholders would not absent themselves from attending meetings."

After the reading of the address the polls were opened,

remaining open for one hour, for the election of three directors to succeed John E. Searles, William Dick and John E. Parsons respectively.

Total number of preferred shares represented and voting, 278,196; total number of common shares represented and voting, 305,103, making a total of 583,209 votes cast, all in favor of the election of Lowell M. Palmer to succeed John E. Searles, who recently resigned; John E. Mayer, to succeed William Dick, resigned, and John E. Parsons to succeed himself.

The resolutions referred to above were offered by Henry B. Reid, of Nash, Spalding & Co., Boston, who also offered a resolution, on behalf of the stockholders, complimenting the board of officers on the highly creditable manner in which the company's affairs had been conducted during the past year.

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SUGAR IN THE WEST INDIES.

At a recent meeting of the Trinidad Agricultural Society, Dr. Morris gave an address on the work of the new agricultural department which he has been charged by the Imperial Government to establish in the West Indies. After a few preliminary remarks, Dr. Morris proceeded: We have this point established, and that is, that the sugar cane is as capable of improvement that is, the sugar cane can give a much larger percentage of sugar than it does at present, as the beet has done. Mr. Vilmorel, who is one of the pioneers in improving the saccharine richness of the beet, has assured me that both he and his father are quite satisfied that if only high scientific skill, if only continued effort is made and proper men are appointed to carry on these sugar cane experiments, he is perfectly satisfied that the yield of the sugar cane could be increased at least 25 per cent. Of course you can easily understand that an isolated cane that may yield 16 per cent of sugar is of no use whatever at this present moment to the planter. The habit of the cane, the characteristic of the cane, must be thoroughly fixed. That would require continuous cultivation over various soils and under various conditions; but if these experiments are continued on the lines that are proposed, if they are continued for a sufficient length of time, there is no reason why we should not get a cane with its characteristics fixed as are the characteristics of the present Bourbon cane.

At the present moment, beginning from the first of October

of this year, I have at my disposal £3,350 yearly to be devoted entirely to the improvement of the sugar cane. That money will be expended in experiments in British Guiana, Barbados, Antigua, St. Kitts, and if necessary any experiments will be assisted here also; but in any case we shall be able, within a very short time after this to start these experiments. There will be men whose time and energy will be entirely devoted to this work. For instance, Mr. Bovell, at Barbados, his whole time will be devoted to these experiments. He will be paid a corresponding salary, and he will do nothing in the world but carry on these experiments in Barbados. Professor D'Albuquerque will give nearly the whole of his time to the sugar cane experiments. In addition to that there will be competent men—scientific men of the highest class who will be engaged to carry on those experiments, so that they will be as continuous and as reliable as they possibly can be. In addition to that there will be a thoroughly scientific investigation into the diseases affecting the sugar cane.

There will also be investigations as regards the application of manures in order that we may be able to have as exact a knowledge of the nature and character of the manures applied to the sugar cane as they have at home. A farmer at home, at the present moment, knows very well if he spends an extra five or ten shillings in manure, per acre, he will get certain results without any doubt whatever. It has been reduced now to a mere routine. So many pounds of this or the other manure will mean an increased crop of the value of so much. That is due to Sir John Lawes and Sir John Gilbert. Their experiments have been carried on for years. The same thing is capable of being done with regard to the sugar cane. In addition to that I have got £100 placed at my disposal by the Government Grant Committee, of the Royal Society, in order that I may prepare colored drawings of all the different cultivated varieties of the sugar cane in different parts of the world. We shall then be able to know exactly what canes are cultivated in Queensland. There will be colored drawings of them, and planters in different parts of the world will be able to agree as to a common name. The difficulty is now that every locality has got its own special name, and there is great confusion in consequence as regards what the canes really are. We shall have those colored drawings prepared with a full description of those varieties and their characteristics as far as we can fix them.

Then a book will be published, at the expense of the Royal Society, or at the expense of Kew, showing colored plates of those different sugar canes. So that we shall have a permanent record, a complete catalogue of the principal sugar canes cultivated in different parts of the world. It is surprising that that has not already been done, but we hope to be able to accomplish that during the course of a few years. Now, I need not say anything more with regard to the sugar cane experiments, and I hope that you will accept what I have said not merely as theories or things in the air. We are actually starting these experiments at the present moment. This money is granted to us for something like ten years. The men are employed, and if there is anything to be done to improve the saccharine quality of the sugar cane I am confident, that during the next ten years, we shall be able to show you some result. Now, in addition to those sugar cane experiments, the Imperial Department of Agriculture will supervise the botanical stations that have been established in the Windward and Leeward Islands.

Then I come to another branch of the duties of the department, and that is to encourage the teaching of agriculture in elementary schools. That will be of two sorts. There will be the theoretical teaching given by the teachers and masters of the schools, and there will be the practical teaching given partly by a staff of agricultural instructors that will be going round viewing the schools and looking after the keeping, also, of a small plot around the school, called the school garden. The school that teaches merely theoretical principles of agriculture will get a small grant. A school which in addition to that will have a school garden round it will get double that amount of grant. We are going to prepare for them by teaching the teachers first, and those teachers will be brought from the country, and their expenses will be paid while they are undergoing a course of instruction at the chief town of the colony. They will have their oral teaching, they will then go to the botanic gardens and spend an hour or two every day in seeing the practical work of the garden. In addition to that there will be put into their hands a small text-book which will form a tropical reader fully illustrated and containing the principles of agriculture in very simple and very plain language.

Now I go to another point, and that is the scientific teaching of agriculture in our colleges. Scientific agriculture is

the only subject that is not taught in the high schools and colleges in the West Indies. There is not a single place in the West Indies where scientific agriculture is, at present, taught, and that is, I think, a most extraordinary thing. There are scholarships for this and the other, and teachers for this and the other,, but there are no teachers for the main business of these colonies. We are going to have teachers attached to such colleges as Harrison's College, in Barbados, the Queen's College, in Trinidad, the college also in Demerara, and so on, and the funds to pay the agricultural teachers will be supplied by the department. We have a fund of £2,600 for that purpose. We hope also to have scholarships, and we hope also to see the day when the young men of the West Indies will not be rushing into professions, and overcrowding professions such as law and medicine, but that they will devote themselves to what I consider the somewhat more effective machinery of assisting the agriculture of their own country.

Now, after that will come what you already have here, and which the other islands have not, and that is horticultural shows. A show will be held annually, but the department, as a department, will assist those shows to this extent—it will assist the shows in offering prizes for the production of improved fruits and vegetables, or for the improved packing of fruit and things for export. The department will also assist these agricultural shows by bringing models of actual machines themselves there to be shown to the people and explained by a man who is specially in charge of that. In addition to that we hope to organize a band of men that we call agricultural instructors. We find that it is not enough to have a botanical station and to have experimental grounds here or there, but if you want to reach the mass of the population in the West Indies, you must take the knowledge round to them and give it to them on the spot. You must show them in their own grounds, how to prune their cocoa or their coffee; you must give them hints as regards raking up ground, forming it so as to allow the application and preparation of manures. These are all important matters, and I can assure you, as far as Jamaica is concerned, an enormous amount of valuable work has been done there, and although Jamaica, at this moment, is not in as prosperous condition as it ought to be, yet that is merely a temporary condition, and I believe that it will soon pass away.

GLYCOLLIC ACID: ONE OF THE ACIDS OF SUGAR CANE.

By Edmund C. Shorey, in Journal of the American Chemical Society.

In continuing work on organic nonsugar in sugar cane, indicated in a paper "On the Principal Amid of Sugar Cane," glycollic acid was prepared from the sugar cane amid by the action of nitrous acid,

$$CH_2NH_2COOH+HNO_2=CH_2OHCOOH+N_2+H_2O$$

and the acid so obtained compared in chemical and physical properties with glycollic acid obtained from other sources, monochloracetic acid, hippuric acid, etc. The samples of glycollic acid obtained in various ways were found to be identical in every respect with that obtained from the sugar cane amid.

The presence of glycollic acid as such in sugar cane was, in a sense, discovered by accident, and its isolation and identification is of considerable interest to the sugar manufacturer, the analyst, and the student of plant physiology. It was noted that on adding a few drops of strong nitric acid to a sample of cane juice, clarified for the polariscope in the usual way, with a slight excess of lead subacetate, a white crystalline precipitate was thrown down. This, on examination, was found to contain lead, and on decomposing with hydrogen sulphide gave an acid solution, which on evaporation to a syrup, deposited needle-shaped crystals, generally grouped in radiating clusters. These crystals were exactly the same in appearance as those of glycollic acid, which had been prepared from various sources, and were found to possess the same chemical and physical properties. To further verify the identity of the various preparations with glycollic acid, this acid was prepared by still another method: viz., by the action of caustic potash on sulphonic acetic acid.

$$CH_2\begin{matrix}SO_2OH\\COOH\end{matrix} + KOH = CH_2\begin{matrix}OH\\CHOO\end{matrix} + KHSO_3.$$

The glycollic acid formed in this case was the same in every respect as that which had already been prepared by other methods.

The crystalline precipitate thrown down by nitric acid appears to be a mixture of normal and basic lead glycollates.

containing from sixty to seventy per cent. of lead. The isolation of glycollic acid from cane juice in this way is open to the objection that it may have been formed from glycocoll by the action of some nitrous acid in the nitric acid, and may not occur as such in the cane. To remove this objection, advantage was taken of the sparing solubility of the copper salt, and the acid has been isolated from cane juice in quite large quantities by the following method:

The fresh cane juice was treated with an excess of freshly precipitated cupric hydroxide, washed thoroughly with cold water by decantation, and the precipitate treated with hydrogen sulphide, filtered from cupric sulphide, and the resulting acid solution evaporated until crystals began to form, when, on cooling, a solid mass of crystals was obtained. By this method glycollic acid equivalent to from seventy-five to eighty per cent. of the total acidity of the juice has been obtained; but its value as a quantitative method has not been established. Glycollic acid prepared in the various ways mentioned has been obtained in four-sided needle-shaped crystals generally arranged in tufts, soluble in water, alcohol, and ether, with a purely sour taste not unlike that of tartaric acid. If great care be taken not to carry the evaporation of the solution too far, the crystals are quickly formed, are completely soluble in water again, are unchanged in the air, melt, turn brown, and decompose below 100° C., and give precipitates in neutral solution with lead acetate, mercuric nitrate, and cupric sulphate.

The most notable characteristic of glycollic acid is the ready formation of the anhydride. If the water solution be evaporated to dryness stopping short of the formation of brown color, the mass of crystals presents the same appearance as that obtained by careful evaporation noted above; but it rapidly deliquesces in the air, and on treating with water a portion is found to be insoluble as white flocks or as a white powder. This insoluble portion is the anhydride, part of which is dissolved by the acid remaining, resulting, if not too dilute, in a thick solution not unlike vaseline, from which needles of glycollic acid are slowly deposited. If the free acid be neutralized with caustic soda the whole of the anhydride is precipitated.

In some respects glycollic acid resembles malic acid, and might in some cases be confounded with it, but it differs at the following points:

1. Glycollic acid is more readily obtained in crystalline form.

2. It is optically inactive; natural malic acid appears to be always optically active, being right or left-handed as it is more or less concentrated.

3. The lead precipitate obtained from neutral solution of glycollic acid is soluble in acetic acid and insoluble in strong ammonia.

4. On heating, glycollic acid chars and suffers decomposition, the chief product of which is formic acid. Malic acid decomposes into malic and fumaric acids, which can readily be identified.

Aconitic acid has often been stated to be present in sugar cane, and for this reason the glycollic acid in cane juice might be mistaken for it, but they can readily be distinguished by the fact that aconitic acid melts at 140° C., boils at 160° C., decomposing into itaconic acid and carbon dioxide. I have before me, at the present writing, preparations of glycollic acid made in the following ways:

1. By the action of nitrous acid on glycocoll, obtained from hippuric acid.

2. By the action of nitrous acid on glycocoll obtained from sugar cane.

3. Obtained directly from cane juice by treatment with cupric hydroxide and subsequent decomposition with hydrogen sulphide.

4. By the action of caustic potash on sulphonic acetic acid and isolation as the copper salt, as above.

These four preparations are exactly the same in appearance, and I have not been able to find any physical or chemical test, by which one can be distinguished from another.

To the sugar manufacturer the presence of glycollic acid presents the following points of interest: In evaporating cane juice in multiple-effect evaporators, acid vapors are sometimes given off and the free acid can be found in the condensed vapor from the following drum, or under other conditions the acid is found in this water in combination. In the Planters' Monthly (Honolulu), 15, 8, E. Hartmann has shown that these condensed vapors contain organic acids, chiefly formic, in combination with iron. Hartmann assumes that the formic acid results from the oxidation of sugar in the process of evaporation; but, as I have already noted, glycollic acid is decomposed below 100° C., giving formic acid as one product of decompo-

sition, and it is quite possible for this decomposition to take place in cane juice under certain conditions.

The formic acid, given off on heating glycollic acid, I have identified by its general physical properties, its action on silver nitrate, and by its conversion into the copper salt, the anhydrous salt containing 41.1 per cent. copper. The exact behavior and conditions under which free glycollic acid and the calcium salt decompose, or undergo change, when heated in sugar solutions, are not yet determined, and, as subjects of future study, present possible explanation of several hitherto unexplained facts in sugar-house work. Three of these may be briefly noted:

1. It is known that if raw acid cane juice be boiled or evaporated, it becomes less acid, and it is also well known that starting with cane juice exactly neutral, the molasses from the second or third sugar may be quite acid, without any fermentation having taken place. The ease with which glycollic acid is converted into the anhydride, which is a neutral body, and the fact that the anhydride, on long boiling with water, is converted into the acid again, have a very probable connection with these facts.

2. The natural coloring-matter of cane juice is quite different from that which results from the processes of sugar manufacture, and which causes largely the dark color of low-grade sugars and molasses. The former can be completely removed by lead subacetate, while the latter, which seems to partake of the nature of caramel, cannot, in many cases, be removed by any reagent. The ease with which glycollic acid chars or becomes brown when heated, explains probably the presence of a portion of this coloring-matter in low-grade products of the sugar-house.

3. It is customary to boil low-grade molasses to a certain consistency known as "string proof," and molasses thus boiled is placed in coolers or wagons and allowed to remain until granulation has reached the point when the massecuite can be conveniently and profitably dried in centrifugal machines. It sometimes happens that in a short time, twenty-four to thirty-six hours after this massecuite has been placed in coolers or wagons, considerable frothing or foaming takes place, and a considerable portion of the massecuite runs over on the floor. In Louisiana, where it happens much more commonly than in Hawaii, this foaming is attributed to boiling at too high a temperature, 165° F. being considered the point beyond

which it is not safe to go. In Hawaii this rule does not always apply, but when foaming takes place it undoubtedly is due to the decomposition of some body in the slowly cooling mass, and the gas resulting from this decomposition entangled in the viscous mass necessarily causes foaming. The presence of glycollic acid, a body easily decomposed at a comparatively low temperature, is not unlikely to be connected with this phenomenon.

To the sugar chemist the presence of glycollic acid in sugar-cane presents at least two points of interest: First as a possible explanation of the formation of the color of low-grade sugars and molasses which every worker with the polariscope finds so troublesome to remove; and second, as a probable explanation of the impossibility of accurately estimating the total solids in cane juice by evaporating to dryness. When cane juice is evaporated to dryness, even in a vacuum, some of the bodies contained suffer decomposition into gaseous products, giving a residue less than the actual weight of solids originally held in solution; the decomposition of glycollic acid is no doubt responsible for a portion of this loss.

The presence of glycollic or hydroxyacetic acid, $CH_2OHCOOH$, in sugar-cane is full of suggestions to the physiologist. The principal amid of sugar-cane, glycocoll, CH_2NH_2COOH, is very closely related to this acid; in what relation do they stand in the plant? Is one formed from the other or have they each their separate role in the plant economy? Glycollic acid is readily obtained by oxidation of dextrose or levulose and so from cane-sugar; does it stand in any relation to the building up of the cane sugar in the plant? Glycocoll and glycollic acid are comparatively simple methyl compounds; how close do they stand to the supposedly simple first product of carbon assimilation? These and numerous other questions present themselves,—questions, the answers to which extend over the whole realm of plant physiology.

Laboratory of Kohala Sugar Co., Kohala, Hawaii, Sept. 8, 1898.

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A writer in Printer's Ink estimates that the New York department stores spend two million dollars every year in advertising—Wanamaker, $325,000, Siegel-Cooper, $300,000, and others in less amounts bring the grand total up to figures stated above.

AN INTERESTING DISCUSSION ABOUT SUGAR CANE.

The Louisiana Sugar Planters' Association have a very pleasant custom of meeting once a month to discuss topics of interest to sugar men. These topics are given out at one meeting and a member is designated to write up the subject. The paper, so presented, forms the text for the symposium and it is needless to say that it is not only interesting, but often instructive, even to old planters. At one of these meetings, held March 9th, the subject was the manner and methods of purchasing cane. Although very little cane is purchased in these islands by sampling or weight, the debate at the meeting brought out some interesting statements regarding cane which will bear copying. One of these refers to what are known here as "suckers" or by Hawaiians as "keikis," (children) being the big abnormal stalks that shoot up like mushrooms, and often measure three or four inches in diameter, and which are too often sent to the mill to be ground, though for sugar making, they are worthless. We quote from the Louisiana Sugar Planter.

Mr. Churchill: Could not Dr. Stubbs give us some idea of what kind of canes to select. I know the beet people, as the carts with the beets arrive, they are dumped into bins—they have a man there who measures the beets and catches a sample at random; but with cane I don't just exactly see how to get a sample.

Dr. Stubbs: I mentioned in my paper that in taking the canes, they must not be selected. I will say this about beets; every beet is of the same age; they are planted at the same time, and come up at the same time. We grow cane under peculiar circumstances in Louisiana. In nearly all foreign countries the first canes that come up are cut down. They want cane that will sucker abundantly, and the cane that will do the largest amount of suckering is the cane most desirable. With us, we want a cane that will sucker as little as possible, because suckering delays the maturity of the crop, and, as I told you just now, we found in '94 or '95, two canes born in July that gave us richer sugar than any others, but as a rule July canes are of no value. You all doubtless remember the French name for these great big short canes, about that big, (indicating), canne-folle, they call it. Sometimes we throw them into the pile; they are nothing less than a mass of glucose—immature canes, and they are probably

twice the size of any other cane in the field in diameter. They are very low in sucrose content. Our canes may be relied upon doing their suckering from March till the middle of June. This is from the same cane, and each would be selecting his own cane, and therefore it is impossible, if we are going to buy on a sample to sample each single stalk, because you may get a stalk 25 above or below the average of the field, but with beets it is different. Beets are of the same age and are restricted in size. No man wants beets over two pounds; they are restricted in size. They don't allow you to go under that or over that, or, rather, they don't care if you go under that. I would say that for eight or ten years we have been counting every cane on the sugar experiment station. Three days of the year. 1st, when they are laid by, 2d about September 1st and 3rd when they are harvested. You will find one-half the canes present in July perish before we go to harvest: you will find some that are emaciated, excluded from the sun, and are standing with hardly any growth during the year. Some are very low in sugar. When they go to the mill, all these are thrown in, and that is one reason why you cannot get the hand mill to give the same extraction; not because the hand mill does not give an approximate test, but because no man will ever select one of these canes as a sample. They will always take the best cane. You cannot send a man to select canes but that he will take the best—higher in sucrose than the average.

Col. Zenor: How do you account for this abnormal growth? I have noticed it frequently. I refer to these enormous canes, twenty to thirty inches long, and as large in diameter as my arm.

Dr. Stubbs: That is what is called the canne folle—"foolish canes" they are called. They are notorious all over the sugar cane fields everywhere, and they have gone into history. They are found in every climate, and are just abnormal productions. These canes contain very little sugar. They are rapid growers, and mature young. If you would send an inexperienced man to the field, sometimes he would probably take that, because it is so large—2½ inches in diameter.

Mr. Soniat: Did you ever try to plant it?

Dr. Stubbs: Not knowingly. I have always avoided it. I have always ordered, in planting these canes, they should be thrown out, because I didn't want to propagate them.

Hon. John Dymond: I would like to ask Dr. Stubbs a

question. It seems to me that, in the course of time both parties will be represented at each central factory; that is, the buyers of cane will have a representative there, as in all the sugar houses of California to look after the weights and after the analysis. How would it do to let the factory representative select. say ten pounds or a given weight of the poorest that he could select, and the representative of the seller select the same weight of the best that he could find, making the test in that way. Should the question of bad cane come up the factory representative would say, "Now, sir. Mr. A. your cases are defective." The sellers' representative and the factory representative would select ten or twenty pounds each—the factory representative selecting the worst and the cane seller the best. There could be no fairer sample than that.

Dr. Stubbs: I would like to ask one question; what constitutes the best cane and what the worst?

Hon. John Dymond: You will determine that by experience.

Dr. Stubbs: I have tried my best to learn that, and if you were to send me tomorrow to my field to select ten of the worst canes, I don't know that I could do it, from a sugar standpoint, for this reason: Frequently these dark, splendid stalks will contain a larger quantity of sucrose than some of our vigorous good healthy canes. I don't see how you could do it.

Hon. John Dymond: As to that, I would say that first of all we will avoid, or rather, the factory would select for the worst samples those immature white canes that have not been exposed to the sun. It would select those large, short canes to which you just now referred, and select also the very small, slender canes; that is, the factory would do that selecting; picking out the very worst. The representative of the factory could select ten or twenty, of what seemed to him to be the worst. On the other hand, the representative of the cane growers would select ripe, straight canes, of full color. If they are ribbon, bright ribbon, and the part of ribbon that was not red would be yellow and not green—it is very easy to select what you think or find ripe.

Chair: If you will send a darkey out, he will pick sweet cane.

Mr. Becknel: He is the best man for the seller.

Dr. Stubbs: When Dr. Maxwell was at the station, he carried on a great number of experiments along this line. He got up what I called "Maxwell's Constant." His plan

was this: He started, I reckon 20 or 30. He went to the field, cut down fifty canes; he then took these fifty canes, spread them out before him, and then selected the best he saw from that pile, then the next best, and so on, until he exhausted the pile. He then ran twenty-five canes through the mill to see if the results were constant, and I think he abandoned it before he got through, after he had made about twenty odd experiments. I suggest that thing as the nearest approach to sampling cane—let the buyer and seller go and take fifty canes from a car, and then let each one draw straws, putting one at a time on each pile until there are twenty-five canes on both; then analyze that twenty-five and in that way you can get the nearest average, so to speak, that I know of.

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NATURAL RENOVATORS OF SOILS.

By Wm. C. Stubbs, Ph. D.

Leguminous crops have been u ed from time immemorial as renovators of soils and for furnishing valuable food for civilized man and domestic animals. Even the wild deer of our forest finds the larger part of his support in the wild legumes of our woods and swamps, beggar lice, wild pea, etc.

This family of plants is a very large one, and every civilized country has adopted one or more of them for food and fertilizing purposes. They all have nodules on their roots, filled with microbes, which, while they draw much of their support from the plants upon which they live, yet supply themselves in a manner not yet clearly understood, with nitrogen drawn directly from the air. Having only an ephemeral existence they are rapidly absorbed at death by the host plant, which utilizes not only the plant food which these microbes have taken from the plant during their short existence, but also the nitrogen which they have directly appropriated from the air. In this way a leguminous crop, through the microbes on their roots, will gather during the season of its growth an almost incredible amount of nitrogen per acre. The microbes are simply purveyors for their hosts, of nitrogen, taking it from the great reservoir of nature, the air, (which contains four-fifths of its volume of free nitrogen) and ultimately transferring it to the plant with which it lives in symbiotic union. The agriculturist of to-day, even the most advanced in theory and practice, fails to appreciate in its fullest measure, this wonderful providence of nature and a

clear discrimination of its use, as is demonstrated daily by the investigations of science, in the selection of plants best adapted to his environments.

Only by the practice of planting leguminous crops can we hope to economically and profitably restore the nitrogenous matter to our soils, and only by the study of the composition, individuality and adaptability to our surroundings of the various leguminous crops can we select one or more which will accomplish the above results in the shortest time. Fortunately we have at the South several excellent crops of the leguminous family to select from, and to show the comparative merits of a few of our best is the object of this bulletin.

It should be remembered, however, in the cultivation of these crops that only nitrogen is gathered from sources exterior to the soil. Whatever of phosphoric acid, potash, or lime, is needed by these plants must be obtained from the soil. If the latter be deficient in any of these ingredients they must be supplied before large crops can be produced. It is true that the usually long tap roots of this family of plants penetrating to deeper depths, will draw upon the subsoil for supplies unavailable to ordinary crops with fibrous surface roots, and these apparently, at first, show no want of mineral fertilizers; but the safest and best procedure, demonstrated by abundant experience, is to apply, liberally, mineral manures (especially acid phosphate in this State), to the leguminous crop before planting. By so doing you place within easy reach of the growing plant every element in abundance, save nitrogen, and thus, under such favorable conditions, it will get in the largest possible quantities from the air.

Leguminous crops must be the foundation stones upon which the future prosperous agriculture of the uplands of the South must be built. Alfalfa, Crimson and Red clover, Lespedeza,ti Hairy vetch, Spanish peanuts, Cow-peas, Velvet beans, etc., all are valuable crops, adapted to different portions of the South.

Other things being equal, that crop which will produce the largest amount of nitrogen, obtained from the air in a given time, is the best crop to grow for fertilizing purposes. Usually, too, that crop containing the largest amount of nitrogen is best for feeding purposes, and it is always advisable, wherever there are stock to be fed, to utilize the crop as stock feed, rather than to turn it under as green manure.

But, when fed, the manure from the animals should be carefully preserved, and scrupulously and intelligently returned to the soil. By intelligently growing the proper crops, and feeding them in proper combinations to live stock, it is possible to improve, gradually, a farm, and, at the same time, profitably grow a large number of stock. Only by such action can the worn lands of the South be restored and made adaptable to profitable stock raising.

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A NEW CANE DISEASE.

A letter from a Barbados planter to a friend in Demarara states that, since the hurricane, a seemingly new and mysterious malady has overtaken the growing canes. The disease so far has only manifested itself in those low-lying pieces which suffered most from the wind and the subsequent deluge of rain, but it is sufficiently evident to cause some feelings of anxiety among the planting community. It appears, from the information contained in the letter, that the symptoms consist of a dark colored patch on the stem of the cane, which gradually increases in size until the top eventually breaks off. As has been stated, only those canes that have been damaged and waterlogged by the wind and rain have so far shown traces of the disease, and it is improbable that the healthier canes will be attacked. Nothing particularly definite about it has yet been ascertained, its presence being apparently unknown to most of the newspapers of the island. The Advocate in its fortnightly weather reports, states: "Some few planters are complaining of injury to the cane crops by some insect which is affecting chiefly the canes which were covered with water after the hurricane. More of this will probably be heard later." This is the only reference to the matter that we have seen, and it may be inferred, therefore, that the malady has not developed to any great extent. In East India and Java the planters have been obliged to burn acres of canes in order to root out a disease which threatened the whole sugar industry in those countries. Should such a drastic measure become necessary in Barbados it would be the most serious of the many "last straws" which have of late menaced the existence of the Barbadian planters. Apart from this, the incoming crop in Barbados has not been appreciably affected by the cyclone, but the harvest will be somewhat later this year than usual. The weather conditions

in the island, like those in Demarara, have recently been excellent, and equally favorable indications are reported from Trinidad, although the cacao crop requires a little more rain to mature the beans.—Demarara Chronicle.

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THE SAN JOSE SCALE INSECT.

The plant-pest known under the above name is attracting a good deal of attention in the United States and Canada, as well as in England and on the Continent. A special Bulletin has been issued on the subject by the United States Department of Agriculture. The seriousness of its attacks may be gathered from the following extract:—"There is perhaps no insect capable of causing greater damage to fruit interests in the United States, or perhaps the world, than the San Jose scale. It is not striking in appearance, and might often remain unrecognized, or at least misunderstood, and yet so steadily and relentlessly does it spread over practically all deciduous fruit trees—trunk, limbs, foliage and fruit—that it is only a question of two or three years before the death of the plant attacked is brought about, and the possibility of injury, which from experience with other scale enemies of deciduous plants, might be easily ignored or thought insignificant, is soon startlingly demonstrated. Its importance from an economic standpoint, is vastly increased by the ease with which it is distributed over wide districts through the agency of nursery stock and the marketing of fruit, and the extreme difficulty of exterminating it where once introduced, presenting, as it does in the last regard, difficulties not found with any other scale insect."

Aspidiotus perniciosus belongs to the sub-family Diaspinae of the Coccidae. It is a small soft insect which secrets a scale separate from itself much like the shell of an oyster. This scale is very minute, round, flattened, and in the case of the male is "grayish, hardly black with a light dot and ring."

As regards the plants attacked, it is stated that, "practically all deciduous fruit trees are subject" to its attacks; also "many shade trees and ornamental shrubs. The pear, peach, plum, apple and cherry are almost equally liable to injury;" also currant and gooseberry bushes.

As was naturally to be expected, all European countries receiving vegetable production, such as fruit, etc., from the

United States have been keenly anxious not to introduce so serious a pest as the San Jose scale into their nurseries or orchards.

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THE PROBLEM OF THE TROPICS.

The Editor of the London Daily Chronicle.

Sir:—In the interesting article on Mr. Kidd's book, "The Control of the Tropics," in the Daily Chronicle, there is a pervading assumption—I presume made also by Mr. Kidd—that white men cannot live and work there. Your reviewer makes this statement three times, as if it were an absolute fact, undisputed and undisputable, and it is probably this assumption which has made it so difficult for Mr. Kidd to give any satisfactory solution of the "Problem of the Tropics." As one who has lived (and worked) for twelve years in the tropics, perhaps you will allow me space to discuss this interesting question.

No great problem can be solved if we begin by assuming data which are erroneous, and I maintain that the assumption as to what men not being able to live and work in the tropics, in good health and in full enjoyment of existence, is not only untrue, but is the very opposite to the truth. It is because white men, as a rule, do *not* work enough in the open air in the tropics that they so often suffer in health, and for anyone who lives rationally as to food and clothing, and who conforms in his dwelling and surroundings to ordinary sanitary laws, a fair amount of bodily exertion is, there as much as here, one of the conditions of perfect health, and to those who thus live I affirm that the tropics, as a whole, are more conducive to health than the temperate regions. A large body of facts go to prove this contention, and I will briefly enumerate them.

First, I may say that I owe to my twelve years' residence in the tropics the comparatively good health I now enjoy. When about seventeen I nearly died of lung disease, but breathing the pure, warm air of the equatorial zone for twelve years completely restored them, so that, ten years after my return home, a physician informed me that my lungs were perfectly sound, and that, in fact, I had the chest of an athlete. Is it not also a well-known fact that, in India, the men who suffer least from the climate are the enthusiastic sportsmen, who seize every opportunity of getting away from

civilization, and who often submit to privations and fatigue with benefit rather than injury to their health. But, turning to a better illustration, do not the rank and file of our European soldiers work, and work pretty hard, too, in every part of India, especially on a campaign, and has it been ever alleged that they "cannot live and work" there, or that they suffer in health from the mere fact of working? On the other hand, the class that does no outdoor work at all in India, and which has fewest outdoor occupations and amusements—the women of the ruling classes—are those who suffer most from the climate. But more striking still is the object lesson we have just had in the Soudan campaign, where English soldiers and officers have been continuously working and fighting for two or three years in one of the hottest and most trying parts of the tropics, and with certainly not more illness than in similar campaigns in tempermate climates.

Again, turn to our sailors. * * *

Then, again, as to there being anything injurious to white men who are permanently settled in the tropics, all the evidence is favorable. In the Moluccas there are many Dutch families who have been there for two or three hundred years, and who are not only perfectly healthy and prolific, but who retain the fair complexions of their European ancestors. In many of our West Indian islands there are, I believe, Creole families of pure English blood, and there are considerable populations of pure Spanish blood in various parts of South America.

It is only when we come to agricultural labor that we find white men refuse to work, and the demand is made for a supply of native colored laborers, and the reason for this is not difficult to see. Agricultural labor among us has always been considered the lowest class of labor, as it is the worst paid, though, as Mr. Ryder Haggard has recently told us, it is really skilled labor of a very pronounced kind. It is also work in which there is no great excitement, and no chance of getting wealth, except when practiced on a large scale with a full supply of very cheap labor. But there is, really, no occupation so full of interest, so enjoyable, so health giving as agriculture to him who practices it for himself; and in the tropics nature is so productive and lavish that five or six hours' work a day would give a larger return than double the amount in our own country.

The more favorable portions of the tropics, extending about

15 deg. on each side of the equator, afford, I believe, the most healthy and the most enjoyable abodes for man, where with the least labor he can obtain the greatest amount of the necessaries, the comforts, and the luxuries of life. and can at the same time develop and cultivate his higher nature. But to do this he must go there not with the object of making a fortune and coming home to live in luxurious idleness, but as a true settler, determined to make his home there. And he must not go with the intention of hiring native labor—a more or less modified form of slavery—but determined to work with his hands as well as with his head. This can be best done—can only be successfully done—by some form of cooperative colonies, of which the Ruskin Colony in Tennessee is perhaps the best type. There, associated labor loses all its terrors, while all the members being approximately equal in education and refinement, there is ample scope for healthy and varied social enjoyments. Such a colony established in some healthy part of the tropics, guided by adequate experience, and with a moderate capital to start with would soon attain to a condition of social and economic prosperity that could hardly be reached elsewhere. The economies of such a colony as will be shown by the fact that at Ruskin the whole cost of three good meals a day is less than a dollar a month a head. And in a tropical colony of sufficient size, when once fully established. every necessary of civilized life would be produced, such as sugar, coffee, cocoa &c., while the cost of houses and clothing would be a minimum.

Here then is a clear and definite solution of the "problem of the tropics." They must be gradually occupied by white men in co-operative association to establish permanent homes, which, surrounded by the glories of tropical vegetation, may in time become something like the legendary paradise.

Yours, &c.,

ALFRED R. WALLACE.

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A French engineer has just invented a process, described by the French scientific review La Nature as very simple and inexpensive, for transforming rapidly into cubes or square blocks possessing absolutely the external appearance and properties of refined sugar all raw sugar made from cane or beets, hitherto whitened and purified by the methods at present in use in the factories of the world. Under the new process the transformation of raw sugar into refined sugar takes only a few hours while in the refineries today it requires from 15 to 16 days.